CLAIMS

1. A channel selector valve for selecting a channel of fluid characterized in that the channel is selected by employing non-electric motive power.

2. The channel selector valve according to claim 1, wherein a drive source provided separately from the channel selector valve generates said non-electric motive power, by which the channel is passively selected.

3. The channel selector valve according to claim 2, wherein the drive source comprises at least one of element components in a refrigerating cycle having the channel selector valve and the channel is passively selected by using the motive power generated by said at least one of the element components.

4. The channel selector valve according to claim 3, wherein said motive power is generated due to a change in physical quantity, which arises in the refrigerating cycle from an action of said at least one of the element components.

5. The channel selector valve according to claim 4, wherein said change in physical quantity is at least one change among changes in pressure, differential pressure and flow rate of fluid in the channel selector valve, said changes arising from an action of said at least one of the element components.

6. A channel selector valve for selecting a channel of fluid comprising:

a movable member moving between a first position and a second position in a housing of the channel selector valve; and

driving means for driving the movable member between the first

position and the second position by employing non-electric motive power, wherein a first selector port out of two selector ports of the housing communicates with a main port of the housing through the interior of the housing when the movable member is situated at the first position, while a second selector port out of the two selector ports of the housing communicates with a main port of the housing through the interior of the housing when the movable member is situated at the second position.

7. The channel selector valve according to claim 6, wherein a drive source generating said non-electric motive power comprises at least one of element components in a refrigerating cycle having the channel selector valve, a change in physical quantity, which arises in the refrigerating cycle from an action of said at least one of element components, is employed as at least a part of said motive power, thereby the channel is passively selected.

8. The channel selector valve according to claim 7, wherein said change in physical quantity is at least one change among changes in pressure, differential pressure and flow rate of fluid in the channel selector valve, said changes arising from an action of said at least one of the element components.

9. A channel selector valve constituted as a four-way selector valve by combining a first and second three-way selector valves, each of which is constituted by the channel selector valve according to claim 6, 7 or 8.

10. The channel selector valve according to claim 9, wherein the channel selector valve is constituted as a four-way selector valve by the first and second three-way selector valves,

the main port of the first three-way selector valve is an inlet port

formed in the housing, through which fluid introduced from the exterior to the interior of the housing of the first three-way selector valve passes, while the main port of the second three-way selector valve is an outlet port formed in the housing, through which the fluid discharged from the interior to the exterior of the housing of the second three-way selector valve passes,

the first selector port of the first three-way selector valve is connected to the second selector port of the second three-way selector valve, while the second selector port of the first three-way selector valve is connected to the first selector port of the second three-way selector valve,

the movable member of the second three-way selector valve moves to the second position when the movable member of the first three-way selector valve moves to the first position, while the movable member of the second three-way selector valve moves to the first position when the movable member of the first three-way selector valve moves to the second position.

11. The channel selector valve according to claim 10, wherein said driving means of the first three-way selector valve comprises:

a first drive mechanism that moves the movable member situated at the first position of the first three-way selector valve to the second position when a difference between a fluid pressure at the first selector port in the first three-way selector valve and a fluid pressure at the second selector port cancels out; and

a second drive mechanism that moves the movable member situated at the second position of the first three-way selector valve to the first

position when a difference between a fluid pressure at the first selector port in the first three-way selector valve and a fluid pressure at the second selector port cancels out.

12. The channel selector valve according to claim 11, wherein the first and second three-way selector valves are constructed so that the main port is isolated from the second selector port when the movable member is situated between the first position and a third position where is nearer to the second position than the first position, while that the main port is isolated from the first selector port when the movable member is situated between the second position and a fourth position where is between the second position and the third position,

the first drive mechanism comprises first storing means for storing energizing force to move the movable member of the first three-way selector valve from the first position to the fourth position, by a fluid pressure being higher than a first predetermined value of the main port, when the movable member of the first three-way selector valve is situated at the first position, said energizing force being less than the first predetermined value, and

the second drive mechanism comprises second storing means for storing energizing force to move the movable member of the first three-way selector valve from the second position to the third position, by a fluid pressure being higher than a second predetermined value of the main port, when the movable member of the first three-way selector valve is situated at the second position, said energizing force being less than the second predetermined value.

13. The channel selector valve according to claim 6, 7 or 8, wherein the

main port is an inlet port formed in the housing, through which fluid introduced from the exterior to the interior of the housing passes,

the housing further comprises an outlet port, through which the fluid discharged from the interior to the exterior of the housing passes,

when the movable member is situated at the first position, the inlet port and the first selector port are communicated with each other inside the housing, while the outlet port and the second selector port are communicated with each other inside the housing,

when the movable member is situated at the second position, the inlet port and the second selector port are communicated with each other inside the housing, while the outlet port and the first selector port are communicated with each other inside the housing.

14. The channel selector valve according to claim 13, wherein the movable member partitions the interior of the housing into a first and second pressure chambers and also forms a first and second spaces in the first pressure chamber,

the inlet port is formed in the housing so as to communicate with the first space and the outlet port is formed in the housing so as to communicate with the second space,

when the movable member is situated at the first position, the fluid introduced from the exterior of the housing into the first space by way of the inlet port is discharged to the first selector port, while the fluid discharged from the second space to the exterior of the housing by way of the outlet port is introduced from the second selector port,

when the movable member is situated at the second position, the fluid introduced from the exterior of the housing into the first space by

way of the inlet port is discharged to the second selector port, while the fluid discharged from the second space to the exterior of the housing by way of the outlet port is introduced from the first selector port.

15. A method of driving the channel selector valve as claimed in claim 14, comprising the steps of:

communicating the first space to the second pressure chamber through an equalizing path formed in the movable member;

energizing the movable member in a direction of moving from the second position to the first position by energizing means for energizing; and

applying a force to the movable member from the first pressure chamber side by fluid introduced from the exterior of the housing into the first space by way of the inlet port, said force being stronger than a resultant force consisting of an energizing force by said energizing means and a force applied to the movable member by fluid in the second pressure chamber introduced from the first space by way of said equalizing path,

thereby the movable member moves from the first position to the second position.

16. The channel selector valve according to claim 14, wherein the housing has a valve seat disposed in the first pressure chamber, the outlet port and the two selector ports are disposed on the valve seat, the second space moves on the valve seat responding to a movement of the movable member moving between the first and second positions, and a place with which the outlet port communicates by way of the second space is selected to be either the first selector port or the second selector port.

17. A method of driving the channel selector valve as claimed in claim 16, comprising the steps of:

communicating the first space to the second pressure chamber through an equalizing path formed in the movable member;

energizing the movable member in a direction of moving from the second position to the first position by energizing means for energizing; and

applying a force to the movable member from the first pressure chamber side by fluid introduced from the exterior of the housing into the first space by way of the inlet port, said force being stronger than a resultant force consisting of an energizing force by said energizing means, a force applied to the movable member by fluid in the second pressure chamber introduced from the first space by way of said equalizing path, and a static friction force between the valve seat and the movable member,

whereby the movable member moves from the first position to the second position and

the movable member is kept staying at the second position by the static friction force between the valve seat and the movable member against an energizing force of the energizing means, after a difference between a pressure of fluid in the first space and that in the second pressure chamber decreases due to circulation of fluid between the first space and the second pressure chamber through the equalizing path.

18. The channel selector valve according to claim 14 or 16, wherein the driving means comprises:

a third drive mechanism that moves the movable member from one

position out of the first and second positions toward an opposite position; and

a fourth drive mechanism that moves the movable member from the opposite position toward the one position,

wherein the third and fourth drive mechanisms employ a change in physical quantity of the interior of the housing due to fluid introduced into the interior of the housing at least as a part of the motive power.

19. The channel selector valve according to claim 18, wherein

the movable member partitions the interior of the housing into the first pressure chamber, the second pressure chamber, and a third pressure chamber situated so that the first pressure chamber is sandwiched between the second and third pressure chambers,

the channel selector valve further comprises a non-electrically-driven pilot valve that selectively communicates the outlet port to either the second pressure chamber or the third pressure chamber, said pilot valve comprises:

a second housing having a second main port that is provided outside the housing and communicates with the outlet port; and

a selector valeve element that patitions the interior of the second housing into a fourth pressure chamber communicating with the third pressure chamber and a fifth pressure chamber communicating with the second pressure chamber, and that is movable in the second housing between a fifth position where the second main port communicates with the fourth pressure chamber and a sixth position where the second main port communicates with the fifth pressure chamber, due to a difference between a pressure of fluid in the second pressure chamber and that in

the third pressure chamber.

20. The channel selector valve according to claim 19, further comprising second driving means to move the selector valve element from one position out of the fifth and sixth positions to an opposire position when the difference between a pressure of fluid in the second pressure chamber and that in the third pressure chamber cancels out.

21. The channel selector valve according to claim 20, wherein

the movable member has a first equalizing path communicating the first space to the second pressure chamber and a second equalizing path communicating the first space to the third pressure chamber,

the movable member has a first subvalve that isolates the third pressure chamber from the fourth pressure chamber when the movable member is situated at the first position and that communicates the third pressure chamber to the fourth pressure chamber when the movable member is situated at the second position, and has a second subvalve that communicates the second pressure chamber to the fifth pressure chamber when the movable member is situated at the first position and that isolates the second pressure chamber from the fifth pressure chamber when the movable member is situated at the second position,

the pilot valve communicates the second main port to the fourth pressure chamber when the selector valve element is situated between the fifth position and a seventh position located nearer to the sixth position than the fifth position, and communicates the second main port to the fifth pressure chamber when the selector valve element is situated between the sixth position and a eighth position located between the sixth position and the seventh position, and

the second driving means has third and fourth storing means for storing energizing force,

the third storing means for storing energizing force stores an energizing force, which is less than a third predetermined value, to move the selector valve element from the fifth position to the eighth position due to a fluid pressure in the fifth pressure chamber exceeding the third predetermined value when the selector valve element is situated at the fifth position, and

the fourth storing means for storing energizing force stores an energizing force, which is less than a fourth predetermined value, to move the selector valve element from the sixth position to the seventh position due to a fluid pressure in the fourth pressure chamber exceeding the fourth predetermined value when the selector valve element is situated at the sixth position.

22. The channel selector valve according to claim 19, wherein

a third main port communicating with the inlet port is further formed in the second housing,

the third main port communicates with the fifth pressure chamber when the selector valve element is situated between the fifth and seventh positions and communicates with the fourth pressure chamber when the selector valve element is situated between the sixth and eighth positions,

and the channel selector valve further comprises second driving means for moving the selector valve element either from the fifth position to the eighth position or from the sixth position to the seventh position when the difference between a pressure of fluid in the second pressure chamber and that in the third pressure chamber cancels out.

23. The channel selector valve according to claim 22, wherein the second driving means has third and fourth storing means for storing energizing force,

the third storing means for storing energizing force stores an energizing force, which is less than a third predetermined value, to move the selector valve element from the fifth position to the eighth position due to a fluid pressure in the fifth pressure chamber exceeding the third predetermined value when the selector valve element is situated at the fifth position, and

the fourth storing means for storing energizing force stores an energizing force, which is less than a fourth predetermined value, to move the selector valve element from the sixth position to the seventh position due to a fluid pressure in the fourth pressure chamber exceeding the fourth predetermined value when the selector valve element is situated at the sixth position.

24. The channel selector valve according to claim 14 or 16, wherein the driving means comprises:

a third drive mechanism to move the movable member from one position out of the first and second positions to an opposite position; and

a fourth drive mechanism to move the movable member from the opposite position to the one position,

wherein one drive mechanism out of the third and fourth drive mechanisms employs a change in physical quantity of the interior of the housing due to fluid introduced into the interior of the housing at least as a part of the motive power, while an opposite drive mechanism employs an energizing force that is applied to the movable member by energizing

means received in the interior of the housing at least as a part of the motive power.

25. The channel selector valve according to claim 24, further comprising a latch mechanism that selectively controls a movement of the movable member from one position out of the first and second positions toward an opposite position.

26. The channel selector valve according to claim 25, wherein the latch mechanism selectively performs a first and second states,

in the first state, a movement of the movable member to the opposite position by the driving means is controlled at the first position, and

in the second state, a movement of the movable member from the one position to the opposite position by the driving means is allowed.

27. The channel selector valve according to claim 26, wherein the latch mechanism comprises a latch piece that moves in the housing following a movement of the movable member between the first and second positions, and in a first state of the latch mechanism, a movement of the latch piece is controlled, thereby a movement of the movable member is controlled at the one position.

28. A method of driving the channel selector valve as claimed in claim 26 or 27, wherein

when the movable member, a movement of which to the opposite position is controlled by the latch mechanism and situated at the one position, is moved to the opposite position, the movable member is once moved by the driving means in a direction of moving from the opposite position to the one position, then is moved from the one position to the

opposite position,

and when the movable member situated at the opposite position is moved to the one position, the movable member is once moved by the driving means in a direction of moving from the one position to the opposite position, then is moved from the opposite position to the one position.

29. The channel selector valve according to claim 24, further comprising:

a valve-opening member that moves from a valve-closing position to a valve-opening position by the motive power while the third drive mechanism generates the motive power;

a pilot path that is opened from a valve closing state thereof by the valve-opening member moved from the valve-closing position to the valve-opening position;

an attenuation mechanism acting when the pilot path is open, which attenuates the motive power generated by the fourth drive mechanism so as to prevent the movable member from moving from the opposite position to the one position; and

a second latch mechanism to selectively control a movement of the valve-opening member from the valve-closing position to the valve-opening position.

30. The channel selector valve according to claim 29, wherein the second latch mechanism alternately repeats a third and fourth states,

in the third state, a movement of the valve-opening member to the valve-opening position is controlled at the valve-closing position, and

in the fourth state, a movement of the valve-opening member from

the valve-closing position to the valve-opening position is allowed.

31. A method of driving the channel selector valve as claimed in claim 29 or 30, wherein

when the movable member situated at the one position is moved to the opposite position, a generation of the motive power by the third drive mechanism is once halted, then the generation thereof by the third drive mechanism is started again and then, the motive power generated by the third drive mechanism is maintained to be a predetermined value exceeding the motive power, which is generated by the fourth drive mechanism and attenuated by the attenuation mechanism,

and when the movable member situated at the opposite position is moved to the one position, a generation of the motive power by the third drive mechanism is halted, then the movable member is moved from the opposite position to the one position by the fourth drive mechanism.

32. The channel selector valve according to claim 24, wherein the driving means comprises a communication pipe that always communicates the second pressure chamber to the first selector port outside the housing.

33. The channel selector valve according to claim 24, wherein the driving means comprises a state-holding mechanism to hold the movable member, which is moved from the first position to the second position, at the second position.

34. The channel selector valve according to claim 33, wherein

the state-holding mechanism comprises:

a state-holding selector valve provided in the second pressure chamber, which by a selecting action of a second selector valve element

selects either a first state or a second state, in said first state the second pressure chamber communiates with the exterior of the housing through a first introducing port and in said second state the second pressure chamber communicates with the exterior of the housing through a second introducing port; and

energizing means for energizing the selector valve, which energizes the second selector valve element so that the state-holding selector valve in the second state selects the first state,

the movable member allows the energizing means for energizing the selector valve to energize the second selector valve element when the movable menber is situated at the first position, while the movable member makes the second selector valve element act a selection so that the state-holding selector valve selects the second state against an energizing by the energizing means for energizing the selector valve when the movable menber is situated at the second position.

35. The channel selector valve according to claim 34, wherein the energizing means energizes the movable member in a direction of moving from the second position to the first position, and a pressure of fluid, which is introduced from the exterior of the housing into the first space by way of the inlet port, acts on the movable member in a direction of moving from the first position to the second position.

36. A method of driving the channel selector valve as claimed in claim 35, wherein

when the movable member moves from the first position to the second position, a pressure of fluid introduced into the first space from the exterior of the housing by way of the inlet port is set higher than a

predetermined value, so that a force, which is applied to the movable member by fluid existing in the first space in a direction from the first position to the second position, is set stronger than a force, which is applied to the movable member by fluid existing in the place to which the second pressure chamber is communicated in a direction from the second position to the first position,

after the movable member has moved from the first position to the second position, a pressure of fluid existing in the first space and a pressure of fluid existing in the second pressure chamber are set so that the movable member is kept staying at the second position.

37. The channel selector valve according to claim 7, wherein the element component is an electrically-driven expansion valve provided in the refrigerating cycle and the change in physical quantity is a change in pressure of fluid due to a change in an opening ratio of the electrically-driven expansion valve.

38. The channel selector valve according to claim 7, wherein the element component is a compressor provided in the refrigerating cycle and the change in physical quantity is a change in a frequency of a mechanical oscillation generated by the compressor.

39. The channel selector valve according to claim 7, wherein the element component is a heat exchanger provided in the refrigerating cycle and the change in physical quantity is a change in pressure of fluid due to a change in the amount of heat exchange by the heat exchanger.

40. The channel selector valve according to claim 13, wherein

the housing is formed cylindrical,

at least the two selector ports are formed at a valve seat situated at

one end of the housing in a direction of a central axis of the housing,

the movable member is constructed by a main valve element, which is received in the housing and rotative around the central axis,

the main valve element is provided with communication means for selectively communicating a selector port out of the two selector ports to the main port,

the main valve element rotates and displaces around the central axis so as to move between the first and second positions, when the main valve element is situated at the first position, a first selector port out of the two selector ports is communicated to the main port by the communication means, and when the main valve element is situated at the second position, a second selector port out of the two selector ports is communicated to the main port by the communication means.

41. The channel selector valve according to claim 40, wherein

at least one port out of the inlet port and the outlet port is formed at the valve seat,

an end surface of the main valve element in a direction of the central axis sits down on the valve seat,

said end surface is provided with second communication means for selectively communicating said one port to a first selector port out of the two selector ports,

when the main valve element is situated at the first position, the second communication means communicates the second selector port to said one port, and when the main valve element is situated at the second position, the second communication means communicates the first selector port to said one port.

42. The channel selector valve according to claim 41, wherein the opposite port is formed at an opposite end of the housing in a direction of the central axis, and the communication means has a communication channel that communicates one end surface side of the main valve element to an opposite end surface side of the main valve element in the interior of the housing.

43. The channel selector valve according to claim 40, further comprising conversion means for converting a moving direction, which converts a movement of the main valve element in a direction of the central axis with respect to the housing into a movement in a rotational direction around the central axis, wherein the main valve element is movable in a direction of the central axis in the interior of the housing, and the driving means makes the main valve element have a reciprocating motion in a direction of the central axis with respect to the housing.

44. The channel selector valve according to claim 43, wherein

the conversion means for converting a moving direction comprises:

a cam groove that is provided in one out of the main valve element and the housing, and extends over a whole circumference of the rotational direction; and

a cam follower pin that is provided in another out of the main valve element and the housing, and moves in the cam groove,

the cam groove has a first and second cam grooves continuing with each other in the rotational direction, said first cam groove is formed inclined so as to part from the valve seat in a direction of the central axis as being displaced in the rotarional direction, while said second cam

groove is formed inclined so as to move nearer to the valve seat in a direction of the central axis as being displaced in the rotarional direction.

45. The channel selector valve according to claim 44, wherein

the cam groove is provided in the housing,

the housing comprises an outer housing and an inner housing received in the outer housing,

the inner housing comprises a first half and a second half divided in a direction of the central axis in a state that the inner housing is received in the outer housing, and

each guide, which constitutes the cam groove in a state that an end of the first half and an end of the second half are joined with each other, is formed at the respective ends of the first and second halves.

46. The channel selector valve according to claim 44 or 45, wherein

at least one port out of the inlet port and the outlet port is formed at the valve seat,

second communication means is formed at an end surface of the main valve element, the end surface faces the valve seat, said second communication means selectively communicates the opposite port to a first selector port out of the two selector ports in a state that the end surface sits down on the valve seat,

when the main valve element is situated at the first position, the second selector port is communicated to the opposite port by the second communication means of the main valve elemnt, and the end surface of which sits down on the valve seat, and

when the main valve element is situated at the second position, the first selector port is communicated to the opposite port by the second

communication means of the main valve elemnt, and the end surface of which sits down on the valve seat.

47. The channel selector valve according to claim 46, wherein the opposite port is formed at an opposite end side of the housing in a direction of the central axis, and the communication means comprises:

a communication channel that communicates one end surface side of the main valve element to an opposite end surface side of the main valve element in the housing;

a subvalve that opens and closes the communication channel;

subvalve energizing means for energizing the subvalve toward a direction of closing; and

valve opening means for opening the subvalve against an energizing force by the subvalve energizing means in a state that the one end surface of the main valve element sits down on the valve seat.

48. The channel selector valve according to claim 47, wherein the housing is disposed so that the opposite end of the housing is situated lower than one end of the housing in a direction of the central axis, and the driving means employs an own weight of the main valve element at least as a part of the motive power.

49. The channel selector valve according to claim 47 or 48, wherein the driving means employs an energizing force by energizing means for energizing main valve element, which energizes the main valve element to part from the valve seat in a direction of the central axis, as a part of the motive power.

50. The channel selector valve according to claim 47 or 48, wherein the driving means comprises second energizing means for energizing the

main valve element, which energizes the main valve element to move nearer to the valve seat in a direction of the central axis.

51. The channel selector valve according to claim 50, wherein the driving means comprises energizing means for energizing the main valve element, which energizes the main valve element to part from the valve seat in a direction of the central axis, due to a resultant force of an energizing force by the energizing means for energizing the main valve element and an energizing force by the second energizing means for energizing the main valve element, the cam follower pin is situated at an intermediate position of the cam groove except end portions of one end side and an opposite end side of the housing in a direction of the central axis, and the main valve element is situated at a neutral position halfway within a reciprocating motion in a direction of the central axis when the cam follower pin is situated at the intermediate position.

52. The channel selector valve according to claim 51, wherein

an end portion of the one end side of the housing in a direction of the central axis out of the cam groove is provided with a groove that continues to a join, at which one end of the first cam groove being situated at the one end side of the housing is connected to one end of the second cam groove,

the groove is formed so that the one end surface of the main valve element sits down on the valve seat in a state that the cam follower pin is situated at the groove,

the groove is disposed being displaced to the lower course than the join in the rotational direction, and

when the main valve element moves in the direction away from the

valve seat in a direction of the central axis, a movement of the cam follower pin is controlled from the groove to a cam groove out of the first and second cam grooves, which is situated at the upper course than the groove in the rotational direction.

53. The channel selector valve according to claim 51 or 52, wherein

an end portion of the opposite end side of the housing in a direction of the central axis out of the cam groove is provided with a second groove that continues to a join, at which an opposite end of the first cam groove being situated at the opposite end side of the housing is connected to an opposite end of the second cam groove,

the second groove is formed so that the main valve element is the farthest away from the valve seat in a state that the cam follower pin is situated at the second groove,

the second groove is disposed being displaced to the lower course than the second join in the rotational direction, and

when the main valve element moves in the direction nearer to the valve seat in a direction of the central axis, a movement of the cam follower pin is controlled from the second groove to a cam groove out of the first and second cam grooves, which is situated at the upper course than the second groove in the rotational direction.

54. The channel selector valve as claimed in any one of claims 40 – 53, wherein slide means for decreasing a sliding resistance between the housing and the main valve element is provided therebetween.

55. A compressor with the channel selector valve as claimed in any one of claims 10 – 14, 16, 18 – 27, 29 – 30, 32 – 35, and 37 – 54, comprising:

a compressor housing having an inlet, which is connected to the outlet port;

a low pressure chamber that is provided in the interior of the compressor housing and communicates with the inlet;

a high pressure chamber that is provided in the interior of the compressor housing and partitioned off from the low pressure chamber; and

a compressing section that is provided in the interior of the compressor housing, compresses fluid introduced into the low pressure chamber from the inlet, and guides the fluid into the high pressure chamber,

wherein a part of the compressor housing partitioning the high pressure housing therein is integrally formed with a part of the housing having the inlet port therein, thereby the interior of the part of the housing communicates with the high pressure chamber.

56. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, characterized in that:

the device controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to control the refrigerating cycle; and

the device controls the channel selector valve by controlling the functional components.

57. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, characterized in that:

the device controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to control the refrigerating cycle; and

the device generates a non-electrical motive power by controlling the functional components and passively controls the channel selector valve by employing the motive power.

58. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising:

a microcomputer that controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to control the refrigerating cycle; and

a control program, by which the microcomputer performs a processing that controls the functional components so as to generate a non-electrical motive power for passively controlling the channel selector valve.

59. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, characterized in that:

the device controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to control the refrigerating cycle;

the non-electrical motive power generated by controlling the functional components is a physical quantity or a rate of change in a physical quantity generated by the refrigerating cycle; and

the device passively controls the channel selector valve by the

physical quantity or the rate of change in a physical quantity.

60. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising:

a microcomputer that controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to control the refrigerating cycle; and

a control program, by which the microcomputer performs a processing that controls the functional components so as to allow the refrigerating cycle to generate a physical quantity or a rate of change in a physical quantity as a non-electrical motive power for passively controlling the channel selector valve.

61. The device for controlling a refrigerating cycle as claimed in any one of claims 57 – 60, wherein the physical quantity, which is a base for controlling the functional components to generate the non-electrical motive power, is a parameter selected from the group consisting of a pressure, temperature, rate of flow, voltage, current, electrical frequency and mechanical oscillation frequency with respect to a control of the refrigerating cycle.

62. The device for controlling a refrigerating cycle as claimed in any one of claims 57 – 60, wherein

the physical quantity, which is the non-electrical motive power and is generated by the refrigerating cycle, is a pressure, differential pressure or rate of flow with respect to fluid existing in the channel selector valve, and

the rate of change in a physical quantity, which is the non-electrical

motive power and is generated by the refrigerating cycle, is a rate of change in pressure, rate of change in differential pressure or rate of change in rate of flow with respect to the fluid.

63. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising a control section that receives input signals sent from an operation command section for commanding an operational condition of the refrigerating cycle and a physical quantity detector section for detecting a physical quantity generated by the refrigerating cycle,

wherein the control section sends output signals to a driving section that drives a drive source of at least one of a plurality of functional components communicated to the refrigerating cycle so as to control said functional component, and the device generates a non-electrical motive power by controlling the refrigerating cycle and passively controls the channel selector valve by the motive power.

64. The device for controlling a refrigerating cycle according to claim 63, wherein the control section controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to start an operation of the refrigerating cycle, thereby controlling the channel selector valve in a state corresponding to the start of an operation, which is commanded by the operation command section.

65. The device for controlling a refrigerating cycle according to claim 64, wherein the control section starts to operate a compressor communicated to the refrigerating cycle in a direction of inverse rotation when the control section decides to select the channel selector valve on the basis of a command of the operation command section.

66. The device for controlling a refrigerating cycle according to claim 63, wherein the control section controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to operate the refrigerating cycle, thereby controlling the channel selector valve in a state corresponding to the operation, which is commanded by the operation command section.

67. The device for controlling a refrigerating cycle according to claim 63, wherein the control section controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to halt an operation of the refrigerating cycle, thereby controlling the channel selector valve in a state corresponding to the halt of the operation, which is commanded by the operation command section.

68. The device for controlling a refrigerating cycle as claimed in any one of claims 63 – 67, wherein the channel selector valve is constructed in a manner that a movable member moves so as to select a channel, and the control section comprises at least one unit selected from the group consisting of: a memory unit for memorizing position data of the movable member of the channel selector valve; a comparison unit and a judge unit for comparing and judging, respectively, the position data and operation command data; and a learning unit learning on the basis of physical quantity data by a control of functional components and control data of the channel selector valve.

69. The device for controlling a refrigerating cycle according to claim 68, wherein the control section receives the input signals, performs a predetermined processing and judges whether a channel is to be changed or not to be changed by the channel selector valve,

then confirms a position on the basis of present position data,

then sends the output signals to the driving section so as to control the functional components in the refrigerating cycle,

then receives new input signals after a predetermined period of time, confirms a position of the movable member, and sets position data of said position as new present position data when said position is changed to a new position.

70. The device for controlling a refrigerating cycle according to claim 69, wherein the control section confirms a position of the movable member by at least one temperature detection means for detecting temperature, at least one pressure detection means for detecting pressure, at least one magnetism detection means for detecting magnetism, at least one current detection means for detecting current or a combination thereof after a predetermined period of time, and then installs position data corresponding to said position into the memory unit of the control section.

71. A device for controlling a refrigerating cycle, which controls a channel selector valve that is communicated to a refrigerating cycle and selects a channel by a movement of a movable member, comprising:

a microcomputer that controls at least one of a plurality of functional components communicated to the refrigerating cycle so as to control the refrigerating cycle; and

a control program, by which the microcomputer performs a processing consisting of the steps of:

receiving input signals;

confirming a position by taking out present position data of a

movable member installed in a memory unit;

carrying out an operation to decide whether the movable member is to be moved of not to be moved, comparing, and judging;

selecting and deciding a driving section;

outputting drive signals to the driving section selected and decided;

judging a position of the movable member by input signals after a predetermined period of time, with or without moving a position of the movable member by a physical quantity generated by at least one functional component that is selected and decided in said step of selecting and deciding or a rate of the physical quantity; and

installing position data of a position of the movable member into the memory unit when said position is changed to a new position,

in order to control the driving section for driving the functional component so that the position of the movable member is to be moved or not to be moved.

72. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising:

a control section that receives input signals sent from an operation command section for commanding an operation state of the refrigerating cycle and from a physical quantity detector section for detecting a physical quantity generated by the refrigerating cycle,

wherein the control section sends output signals to a driving section that drives a drive source of at least one of a plurality of functional components communicated to the refrigerating cycle so as to control said functional component and to control the refrigerating cycle, and when

judging to select a channel by using the channel selector valve on the basis of a command of the operation command section, the control section sends output signals to a driving section for driving a power source of a compressor so as to start an operation of the compressor of the refrigerating cycle and starts an operation of the refrigerant cycle so as to generate a motive power exceeding a first predetermined motive power, thereby the channel selector valve is passively controlled.

73. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising:

a control section that receives input signals sent from an operation command section for commanding an operation state of the refrigerating cycle and from a physical quantity detector section for detecting a physical quantity generated by the refrigerating cycle,

wherein the control section sends output signals to a driving section that drives a drive source of at least one of a plurality of functional components communicated to the refrigerating cycle so as to control said functional component and to control the refrigerating cycle, and when judging to select a channel by using the channel selector valve on the basis of a command of the operation command section, the control section sends output signals to a driving section for driving a power source of a compressor so as to start an operation of the compressor in a direction of inverse rotation and starts an operation of the refrigerant cycle so as to generate a motive power exceeding a third predetermined motive power, thereby the channel selector valve is passively controlled.

74. The device for controlling a refrigerating cycle according to claim

power of the channel selector valve,

then operates the refrigerating cycle for a fourth predetermined period of time,

then halts the operation of the refrigerating cycle for a fifth predetermined period of time, and

then starts an operation of the compressor with a first predetermined capacity so that a motive power exceeding a first predetermined motive power is generated as an internal motive power of the channel selector valve.

78. The device for controlling a refrigerating cycle according to claim 72, wherein the control section sends output signals to a throttle device driving section so that an opening ratio of a throttle device of the refrigerating cycle is almost fully opened or almost fully closed.

79. The device for controlling a refrigerating cycle according to claim 72, wherein the control section sends output signals to a heat exchanger motor driving section so that a heat exchanger motor of the refrigerating cycle is kept halted.

80. The device for controlling a refrigerating cycle according to claim 72, 75, 76 or 77, wherein once the control section starts an operation of the compressor, the control section sends output signals to the compressor driving section after a first predetermined period of time and drives the power source of the compressor so that a motive power exceeding a second predetermined motive power is generated, thereby operating the refrigerating cycle.

81. The device for controlling a refrigerating cycle according to claim 78, wherein once the control section starts an operation of the

compressor, the control section sends output signals to the throttle device driving section so as to set the opening ratio of the throttle device a predetermined opening ratio after a first predetermined period of time.

82. The device for controlling a refrigerating cycle according to claim 79, wherein once the control section starts an operation of the compressor, the control section sends output signals to the heat exchanger motor driving section after a second predetermined period of time so as to start an operation of the heat exchanger motor, sends output signals to the compressor driving section so as to generate a motive power lower than a first predetermined motive power, and drives the power source of the compressor so as to generate a motive power exceeding a second predetermined motive power, thereby operating the refrigerating cycle.

83. The device for controlling a refrigerating cycle according to claim 80, 81 or 82, wherein when the control section performs a predetermined processing and judges to select a channel by the channel selector valve or to halt an operation of the refrigerating cycle,

the control section sends output signals to the compressor driving section: to drive the power source of the compressor with a third predetermined capacity so as to generate a motive power lower than a second predetermined motive power; or to halt the operation of the compressor, thereby halting the operation of the refrigerating cycle.

84. The device for controlling a refrigerating cycle according to claim 72, wherein when the control section performs a predetermined processing and judges to select a channel by the channel selector valve or to halt an operation of the refrigerating cycle,

the control section sends output signals to the compressor driving section to halt the operation of the compressor, then keeps the refrigerating cycle standby for a third predetermined period of time, then sends output signals to the compressor driving section to start the operation of the compressor, then renews position data in a memory unit to a first or second position after a first predetermined period of time, thereby halting the operation of the compressor again.

85. The device for controlling a refrigerating cycle according to claim 72, 74 or 84, wherein when positional data memorized by a memory unit of the control section indicate a first or second position, the control section starts an operation of the refrigerating cycle so that a motive power exceeding a first predetermined motive power is generated as an internal motive power of the channel selector valve.

86. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising:

a control section that receives input signals sent from an operation command section for commanding an operation state of the refrigerating cycle and from a physical quantity detector section for detecting a physical quantity generated by the refrigerating cycle,

wherein the control section sends output signals to a driving section that drives a drive source of at least one of a plurality of functional components communicated to the refrigerating cycle so as to control said functional component and to control the refrigerating cycle, and when judging not to select a channel by using the channel selector valve on the basis of a command of the operation command section, the control

section sends output signals to a driving section for driving a power source of a compressor so as to start an operation of the compressor of the refrigerating cycle and starts an operation of the refrigerant cycle so as to generate a motive power lower than a first predetermined motive power, thereby the channel selector valve is passively controlled.

87. The device for controlling a refrigerating cycle according to claim 86, wherein the control section starts an operation of the compressor with a second predetermined capacity.

88. A device for controlling a refrigerating cycle, which controls a channel selector valve communicated to the refrigerating cycle, comprising:

a control section that receives input signals sent from an operation command section for commanding an operation state of the refrigerating cycle and from a physical quantity detector section for detecting a physical quantity generated by the refrigerating cycle,

wherein the control section sends output signals to a driving section that drives a drive source of at least one of a plurality of functional components communicated to the refrigerating cycle so as to control said functional component and to control the refrigerating cycle, and when judging not to select a channel by using the channel selector valve on the basis of a command of the operation command section, the control section sends output signals to a driving section for driving a power source of a compressor so as to start an operation of the compressor of the refrigerating cycle and starts an operation of the refrigerant cycle so as to generate a motive power exceeding a first predetermined motive power, thereby the channel selector valve is passively controlled.

89. The device for controlling a refrigerating cycle according to claim 88, wherein when the control section performs a predetermined processing and judges to halt an operation of the refrigerating cycle,

the control section sends output signals to the compressor driving section so as to halt the operation of the compressor, then keeps the refrigerating cycle standby for a third predetermined period of time without renewing position data in a memory unit.